

1 The Particle, The Wave And The Momentum Shell

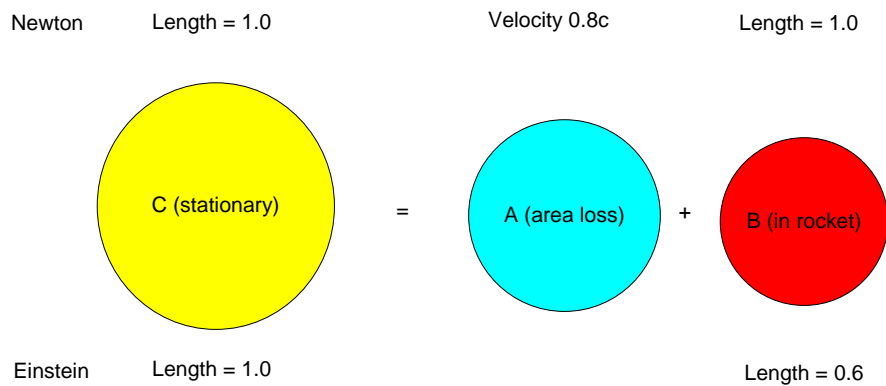
How does one move from a particle to a wave and vice versa. Also how does a wave interact with a particle? Also how can we also factor in a WaveWithinWave design pattern for this? How does one draw this? In this chapter I will define the Momentum Shell which is the basis for Compression Waves and how Pi-Shells collide and interact with one another.

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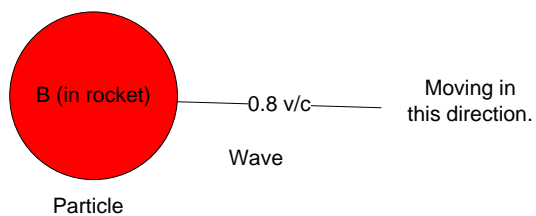
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1.1 Particle And Wave Notation In Pi-Space

Every moving object has an associated wave no matter how large or small which was shown by DeBroglie. How does one draw a particle and wave? It's pretty simple in Pi-Space, instead of drawing an Observer Pi-Shell, **we draw the moving Pi-Shell and the diameter line on the outside which is the wave. In this example I draw a relatively large wave for $v = 0.8c$.**



De Broglie Particle And Wave Diagram



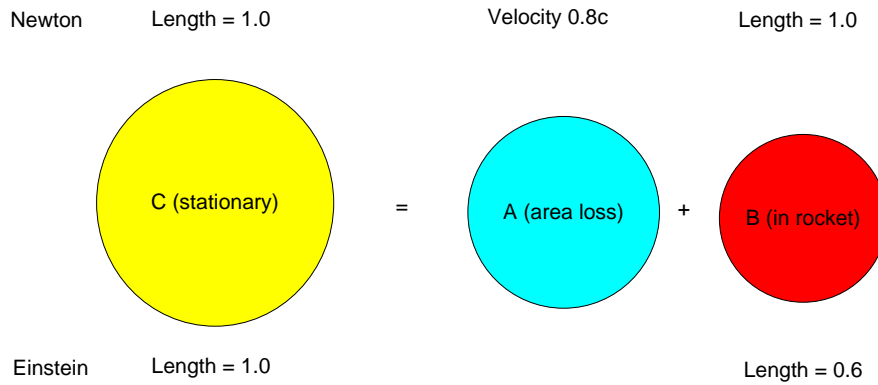
Each moving particle has an associated wave.

The idea is that the wave is attached to the Pi-Shell and creates a place of Least Time which the Pi-Shell moves towards if there are no other external forces at work e.g. gravity. This is how we draw Newton's first Law as a Wave And a Particle. In Pi-Space the wave is a compression wave which I will cover in more detail shortly.

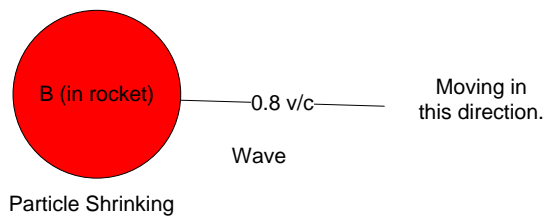
This notation is very clumsy and will be refined by the Momentum Shell shortly but the basic idea holds that a Pi-Shell needs some kind of wave to guide it in the direction it needs to travel in and remember it.

1.2 Particle And Wave Stationary And Near The Speed of Light

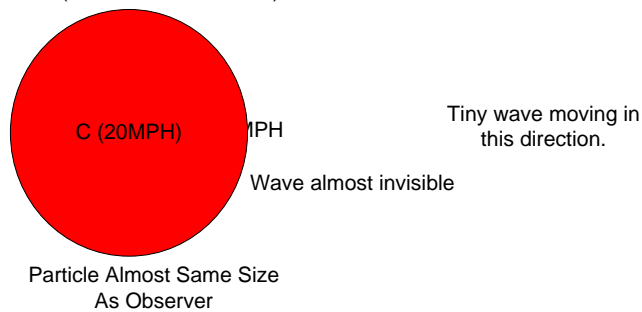
A relatively stationary object has a wave which is almost negligible but it is there. An object traveling close to the speed of light is more wave than particle but the particle remains.



De Broglie Particle And Wave Diagram 0.8c



De Broglie Particle And Wave Diagram 20 MPH (Area loss almost zero)



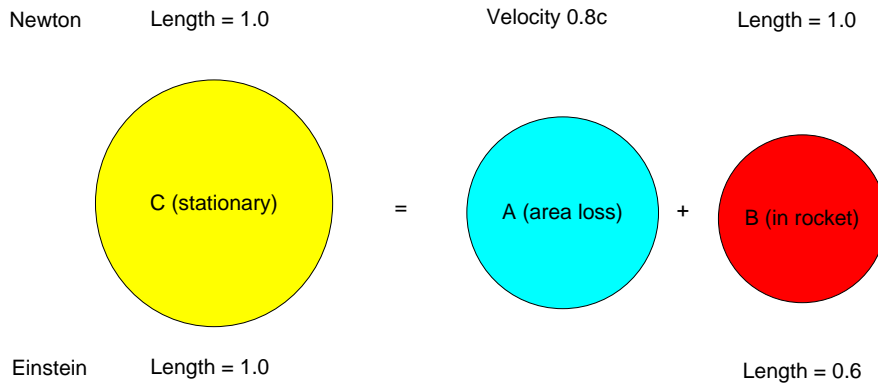
1.3 De Broglie Hypothesis For Wave Interpreted In Pi-Space and the Momentum Shell

De Broglie formulated energy in the following way.

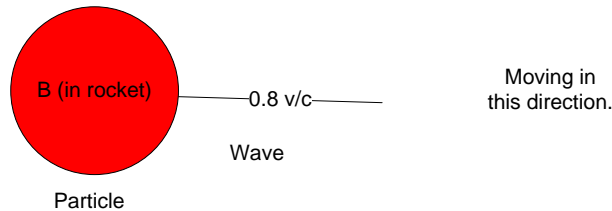
$$E = \sqrt{p^2 c^2 + m_0^2 c^4}$$

How can we draw this in Pi-Space? The goal is to describe how a Pi-Shell shrinks and also describe how it knows the direction in which to travel. The above energy formula can be drawn as **one Pi-Shell inside another. The outer Pi-Shell indicates the direction of**

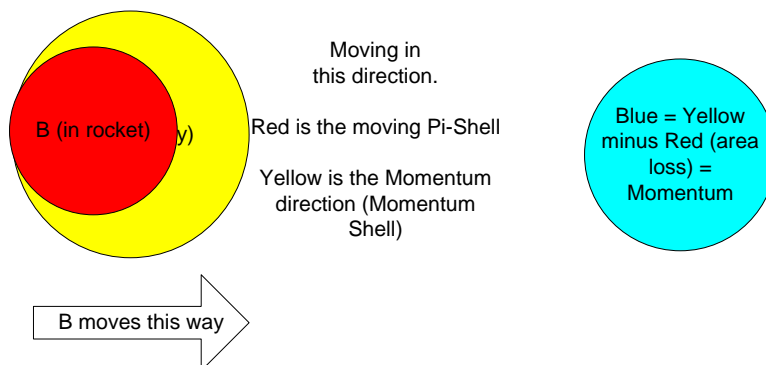
momentum. The inner Pi-Shell indicates the new size of the Pi-Shell/atom. The combination of the two is the total energy of the system which includes the momentum.



De Broglie Particle And Wave Diagram



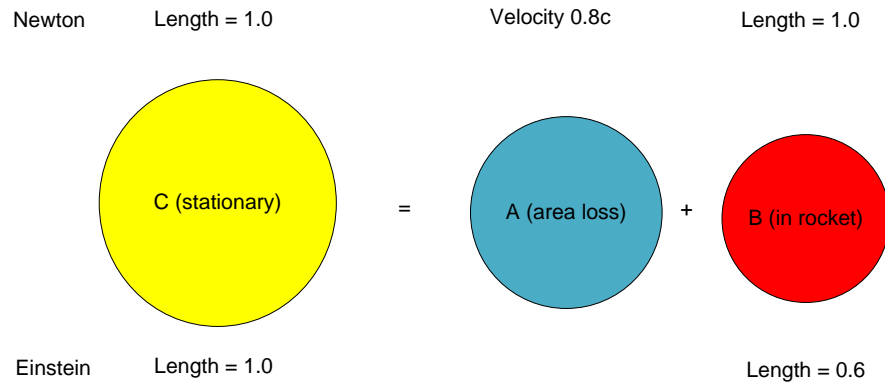
This is the De Broglie Hypothesis visualized in Pi-Space



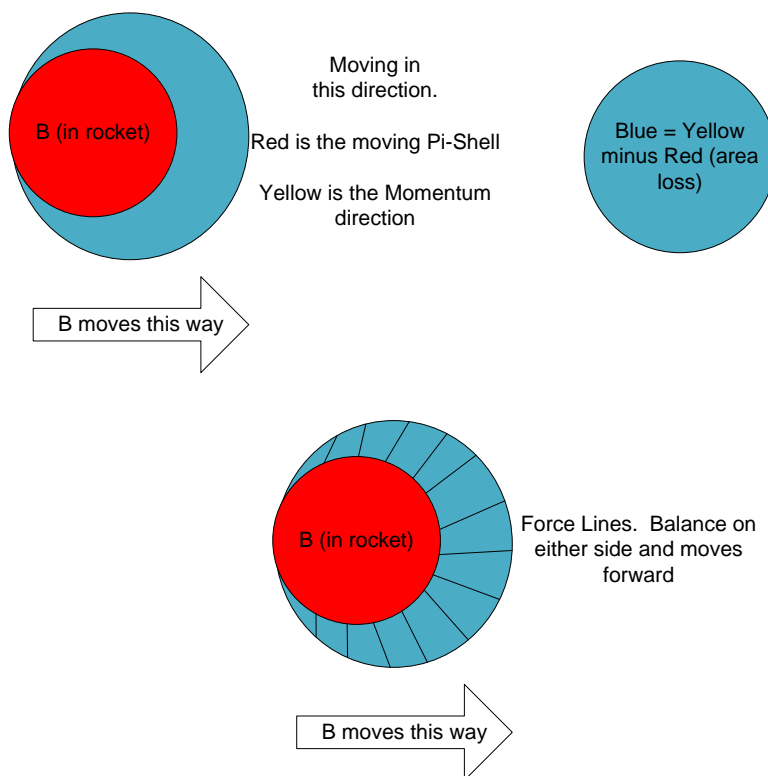
Please understand this Pi-Shell inside Pi-Shell approach before proceeding. The concept is that the yellow Pi-Shell which was the former stationary one contains the momentum component and when it moves this is part of the rocket Pi-Shell (surrounding it in a field like way). This **momentum shell** is what interacts with other Pi-Shells and contains what I call the Compression Waves. This tallies with the idea of De Broglie Hypothesis adding two Pi-Shells to form total Energy.

1.4 Force Lines And The Momentum Shell

The momentum shell contains force lines which calculate the overall direction of the Pi-Shell. These interact with any object such as another Pi-Shell in their path.



This is the De Broglie Hypothesis visualized in Pi-Space



1.5 De Broglie And The Momentum Shell

The momentum shell contains the momentum of the moving Pi-Shell. De Broglie figured out the relationship between the Momentum Shell and wavelength. He realized that there is an associated wave with each particle. These waves are contained in the momentum shell according to this theory.

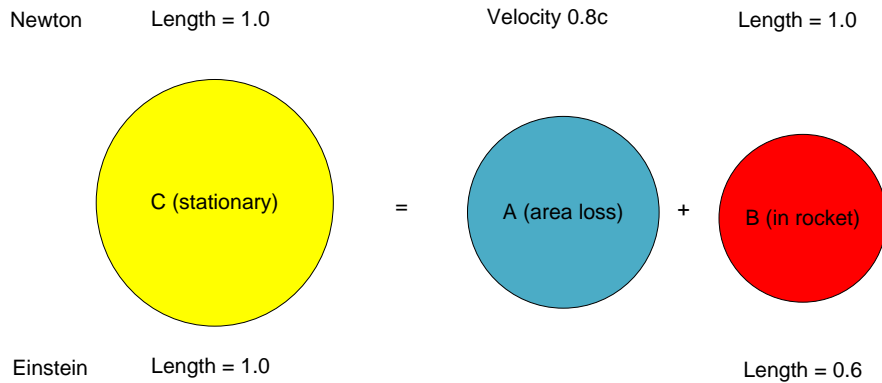
$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

$$\frac{mv}{\sqrt{1 - \frac{v^2}{c^2}}} = hf$$

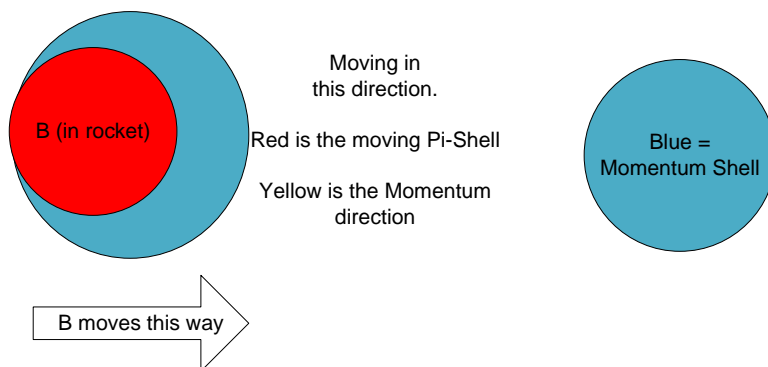
This relative wavelength change only occurs if there is relative movement. In this theory, the relative shortening wavelength is in the momentum shell.

Velocity v is divided by the size of the adjusted Observer Pi-Shell. Normally where $v \ll c$ this is 1.0 so we can use the Observer Pi-Shell. In the diagram where $v = 0.8c$, the adjusted moving Pi-Shell is 0.6 so we need to take that into account to understand the true size of the momentum Pi-Shell.

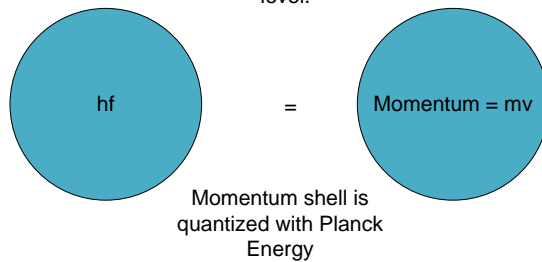
Frequency increases with velocity and therefore wavelength shortens in the momentum Shell.



This is the De Broglie Hypothesis visualized in Pi-Space



De Broglie relationship.
Momentum has a wavelength at the Planck level.



1.6 Momentum Wave And The Compression Wave

De Broglie formulated wavelength of various moving objects.

For example as baseball with mass 0.15kg and $v = 40\text{m/s}$ has a wavelength 1.1×10^{-34}

An electron accelerated with 100 volts = $5.9 \times 10^6 \text{ m/s}$ has a wavelength of 1.2×10^{-10}

So we can see the electron is more wave than particle.

We represent the wave as a wave within a wave. I have already modeled this as a Compression Wave but this can also be called a Momentum Wave. The reason I call it a compression wave is that it compresses the Particle.

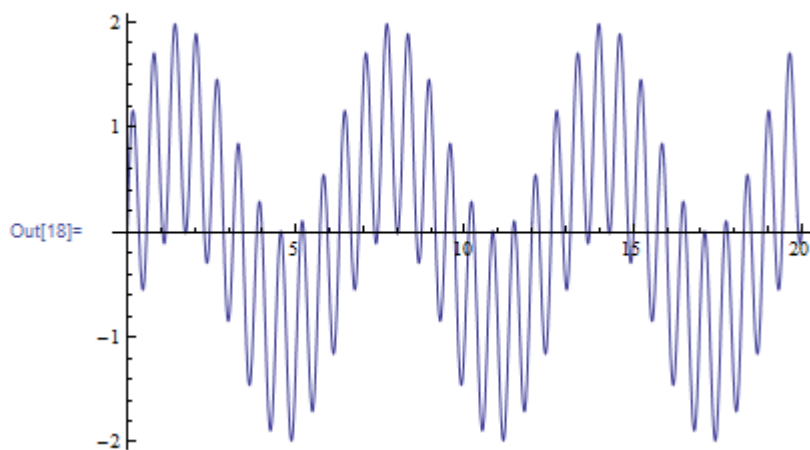
We can draw the Compressions/Momentum wave as follows.

In Pi-Space, mass is the non-local wave within the local wave. The higher the amplitude of the non-local wave the more mass it has. For now, we will not concern ourselves with the Mathematics around it. This is the concept. **Mass is simply the non-local wave within the local-wave.** Therefore Mass has a wave component. I will drill down into the specifics later. Here we have a mass carrying wave. The local wave is simply $\sin[x]$. The non-local wave is the addition.

The carrier wave is the **Velocity component**.

Combined these form the Momentum/Compression waves which form the Momentum Component/Shell of a moving Pi-Shell.

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In[18]:= Plot[Sin[x] + 1 Sin[10 x], {x, 0, 20}]
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$\sin[x]$ is the Velocity Component

$\sin[10x]$ is the Mass Component